

United Water Environmental Services Inc.
1111 Nantasket Avenue
Hull, MA 02045-1313
Phone: (781) 925-0906



August 28, 2014

Mr. David Turin
U.S. Environmental Protection Agency
EPA New England, Region 1
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Re: Town of Hull - Bypass Event - February 2013 - Final Follow-up Report

Dear Mr. Turin:

As was previously reported to you along with the Massachusetts Department of Environmental Protection ("MA DEP") and Massachusetts Emergency Management Agency ("MEME"), there was a total bypass of the Town of Hull Water Pollution Control Facility ("Facility") on Friday February 28th 2013. Per both the Town of Hull ("Town") and United Water Environmental Services Inc. ("United Water")'s incident procedures, once Facility operations were resumed, United Water staff, in conjunction with the Town, evaluated the bypass to identify immediate and contributing causes for the event and corrective actions to minimize the potential for this event to be repeated. At your request, the Town and United Water, as contract operator of the Facility, are providing the results of this review including a description of the event, response to the event and actions taken and in progress, to minimize the potential for any further unplanned total Facility bypasses.

Summary of the Bypass:

Following winter storm Nemo on February 9, 2013, the Facility experienced high influent flows due to rain and snow melt. Effluent flows from the plant increased from an average of 1.3 MGD to an average of 2.4 MGD in the weeks leading up to the event. During the day and evening of February 26th and the morning of February 27th, the Town received over 1.5 inches of rain and over 12 inches of snow melt which further increased flows to the Facility and the level of the Town's water table. Daily effluent flow on February 26th had increased to 3.3 MGD. In addition, the region was experiencing astronomically high tides and storm surges exacerbating these issues. Between 8:45 AM and 9:45 AM on February 27th, influent pump #3 check valve failed in the open position. Pump #3 began spinning backwards resulting in partial flow from pumps #4 and #5 to be recycled back to the influent wet well through pump #3, spiking the wet well level to over 106 inches. Pump #3 was taken out of service due to the failed check valve and also from a crack in the suction valve flange that occurred during pump isolation. The check valve was forced into the closed position and by 10:00 AM the influent wet well had dropped back to just over 63 inches. The loss of influent pump #3 reduced the Facility's influent pumping capacity from 8.5

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MGD to 6.4 MGD. On February 27th at approximately 11:00 am, MA DEP inspector, Dave Burns was notified of this pump failure and its removal from service.

United Water staff continued to monitor interceptor level, influent flow, wet well levels and process status throughout the day of February 27th. During the early afternoon of Thursday, February 27th pump stations were cycling more frequently and the main 36" interceptor level had increased to 18". Gates for the two offline aeration tanks were open to assist with flow management at approximately 2:00 PM. Although the rain had stopped, around 3:00 PM the influent wet well level increased to 73 inches and continued to rise. Facility staff set up a portable pump at 3:45 PM in the influent pump room sump to replace the sump pump which was having mechanical issues. This pump was pumping through a 2" hose to the parking lot and was included in the five day report submitted for the Facility bypass event. United Water staff remained on site through the evening to continue to monitor plant flows and to address pump station alarms.

The staff routinely (~ every 45minutes) monitored the grit chamber, influent wet well and influent pump room throughout the evening. Pump stations 9 and 3 continued to experience abnormally high flows and additional staff was called in to allow for continued facility monitoring as well as to address the station alarms. Between 7:15 and 7:30 PM the interceptor level reached 36 inches and remained full during the remainder of the event. Wet well levels continued to gradually elevate with 4 of 5 influent pumps running. At approximately 10:00 PM a 6" portable diesel pump was energized to shave flow (~1,200gal/min) from the headworks to the aeration tanks. This pump bypassed screened influent directly to the aeration tanks, bypassing primary clarification, to help manage flow into the facility but maintain aeration and disinfection of all flow. Staff continued to monitor facility levels and with the added bypass pumping wetwell levels were elevated but maintaining.

Between midnight and 12:30AM on February 28th influent pump #4 failed. As part of the post- event investigation all influent pumps were sent out for an independent evaluation and it was determined that a 2x4 wood block had become lodged in influent pump #4's volute. The loss of this pump reduced influent flow pumping capacity from 6.4 MGD to 4.2 MGD with influent flows still over 6 MGD. The grit chamber quickly exceeded its capacity and overflowed flooding the grit room. Upon the flooding, influent infiltrated into the influent pump room through structural cracks behind the grit room wall and eventually entering the HVAC and scrubber duct systems. By 1:40 AM the influent room was flooded above the influent pump motors and influent pumping ceased along with the headwork's screening and grit systems. At ~ 1:50 AM the fire alarm was activated and the Town Fire Department responded to the Facility. Influent flow then continued to fill the lower level mechanical/electrical room where both influent and effluent control panels were located as well as the switch gear for both generators. Due to both safety and fire concerns, the Fire Department had all power to the Facility shut down at ~2:30 AM. This included having the Town's power and light disconnect power at the pole connection and having the generators taken off line. Due to having no effluent pumping ability, the grit chamber bypass pumping was diverted from the aeration tanks to the driveway. Emergency portable pumps (one 6" @ 1,200gal/min and one 4"

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@ 800gal/min) were started at 3:45 AM to further assist pumping influent flow from the Facility in an attempt to prevent further flooding and damage to the Facility and prevent back ups in the collection system. Between 4:00 and 4:30 AM both MA DEP and EPA were notified of the Facility shut down and bypass.

Response to the Bypass:

Both Town and United Water representatives responded to the Facility upon notification of the event and MEMA was called in by the Fire Department to assist with management of the emergency. Additional portable pumping was mobilized to the Facility to manage flow from the collection system, prevent backups in the collection system or residences and to start pumping out the flooded Facility. These pumps arrived on site at approximately 9:45 AM and included two (2) 12" pumps, two (2) 8" pumps and a 6" pump. By 10:30 AM initial pumping was set up from the influent manhole upstream of the Facility to the chlorine contact tank but following further discussion between MA DEP, Town staff, United Water staff, and MEMA staff this pumping configuration was moved to an ocean discharge across the street. By 1:45 PM influent was diverted from the Facility and being discharged to the Atlantic Ocean and all portable pumping from the Facility headworks to ground had been stopped. Flow pumped from the Facility was monitored for pH and salinity. Fecal, BOD and TSS analysis was conducted and all data was provided in the Facility's March monthly monitoring report. All remaining material within the Facility was pumped to the treatment tanks and eventually treated.

The collection system hydraulic and salinity levels were evaluated during the morning to identify if there had been any breaches in the collection system. These evaluations included visual inspections of manholes throughout the system and inspection of areas identified to have heavy surface flooding from the storm surge. These checks continued periodically during the days following the event until facility pumping and treatment was restored. Subcontractor Inland Waters was contracted to camera areas of the collection system identified to be of concern. On Gunrock Avenue, an 18" section of gravity sewer pipe was identified to have been exposed and breached from surface erosion. This section of piping was immediately repaired upon discovery by Inland Waters. No other immediately identified breaches in the collection system were discovered.

The Town and United Water mobilized additional portable diesel pumps to provide influent and effluent pumping for the Facility and portable emergency generators to provide power to those electrical systems not impacted. On Saturday March 1st at 11:15 PM the ocean bypass was discontinued and flow was resumed to the Facility where it was treated through the aeration and disinfection processes.

Corrective Actions:

The following corrective actions were taken by the Town, its engineers, and United Water:

Corrective Action Items:

- All influent pumps were evaluated by an independent vendor and either re-built or replaced based on the vendor's recommendation.
- Replaced influent pump #3 suction side isolation valve and discharge side check valve.

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- All effluent pumps were evaluated by an independent vendor and as needed rebuilt or repaired based on the vendor's recommendation.
- Electrical System repair approach was evaluated by Town Engineers and United Water to determine the feasibility of installing new electrical systems above ground level. This evaluation identified significant space and code compliance issues which eliminated this as a full recovery option but where ever possible these systems were moved above ground level.
- All electrical systems between main circuit breaker and MCC's were rehabilitated or replaced.
- New VFD's with bypass were installed on all influent and effluent pumps.
- SCADA and communication systems were restored.
- Industrial hygiene and HVAC system evaluation completed.
- Temporary heating and air-conditioning units installed.
- Limited HVAC systems and scrubber restored to operation.
- Bond appropriation for new HVAC system approved June 2014. Design of new system in progress

The following preventive actions were or continue to be taken by the Town, its engineers, and United Water:

Preventive Action Items:

- Based on vendor feedback, all influent pump couplings were replaced with heavy duty couplings.
- Installation of manual fine screening bar screens added to headworks.
- Bond appropriation for new screening system approved June 2014. Design of new system in progress.
- Purchase of 12" Portable Diesel Pump (3,000gallons/min) and replacement of manhole rim and cover for the influent main on Nantasket Avenue.
- Continued annual jetting and inspection of the collection system utilizing local subcontractor.
- Repairs and sealing of collection system I/I identified in inspections.
- Seal of structural cracks in grit room in progress.

If you have any questions regarding the response, and corrective and preventive actions initiated following the Facility bypass, please let us know.

Very truly yours,

John Marcin, Area Manager
United Water Environmental Services

Cc: Dave Burns, MA-DEP
Jim Dow, Town of Hull
Terry O'Callaghan, UWES
Jason O'Brien, UWES